uff   Universidade Federal Fluminense   **LISTA 5 - 2010-2**

EGM - Instituto de Matemática

GMA - Departamento de Matemática Aplicada   Integração: miscelânea

Nos exercícios 1 a 24, resolva a integral indicada. Em alguns casos será preciso aplicar mais de uma técnica de integração.

1. $\displaystyle\int \frac{\text{arcsen}\sqrt{x}}{\sqrt{x}}\ dx$

2. $\displaystyle\int \frac{dx}{\sqrt{4x+x^2}}$

3. $\displaystyle\int \frac{\sec^2 x}{(4-\tan^2 x)^{\frac{3}{2}}}\ dx$

4. $\displaystyle\int \frac{x\,\text{arcsen}\,x}{\sqrt{1-x^2}}\ dx$

5. $\displaystyle\int \frac{dx}{x^2-2x-3}$

6. $\displaystyle\int \left(\sec^2 x\right)\ \ln\left(\tan x\right)\ dx$

7. $\displaystyle\int \frac{dx}{\sqrt{x-1}+\sqrt{x+1}}$

8. $\displaystyle\int \frac{e^x+e^{2x}+e^{3x}}{e^{4x}}\ dx$

9. $\displaystyle\int \frac{dx}{1+\sqrt{1+x}}$

10. $\displaystyle\int \frac{dx}{1+e^x}$

11. $\displaystyle\int \frac{dx}{\sqrt{x}+\sqrt[3]{x}}$

12. $\displaystyle\int e^{\sqrt{x}}\ dx$

13. $\displaystyle\int \frac{x\ \arctan x}{\left(x^2+1\right)^3}\ dx$

14. $\displaystyle\int x\ln\sqrt{1+x^2}\ dx$

15. $\displaystyle\int \text{arcsen}\ \sqrt{x}\ dx$

16. $\displaystyle\int e^x\ 2^{e^x}\ 3^{e^x}\ dx$

17. $\displaystyle\int \frac{x}{1+\text{sen}\,x}\ dx$

18. $\displaystyle\int \sqrt{1+e^x}\ dx$

19. $\displaystyle\int \frac{7}{x^2-6x+18}\ dx$

20. $\displaystyle\int \frac{3x+2}{x^2+8x+25}\ dx$

21. $\displaystyle\int \tan^3 x\ \sec^4 x\ dx$

22. $\displaystyle\int x\sqrt{1+x}\ dx$

23. $\displaystyle\int \frac{dx}{x\left(1-x^2\right)^{\frac{3}{2}}}$

24. $\displaystyle\int \text{sen}\,3x\,\text{sen}\,2x\ dx$

Nos exercícios 25 a 30, calcule a integral definida dada.

25. $\displaystyle\int_0^{\frac{\pi}{4}} \frac{dx}{\sqrt{1+3\sec^2 x}}$

26. $\displaystyle\int_0^{\frac{\pi}{4}} e^{3x}\,\text{sen}\,(4x)\ dx$

27. $\displaystyle\int_3^4 \frac{x^3}{\sqrt{x^2+3}}\ dx$

28. $\displaystyle\int_0^1 \frac{x^2}{\sqrt{4-x^2}}$

29. $\displaystyle\int_0^4 \frac{x-2}{2x^2+7x+3}\ dx$

30. $\displaystyle\int_0^{\frac{\pi}{2}} \cos^3 x\ \text{sen}^2 x\ dx$

RESPOSTAS DA LISTA 5

1. $2\sqrt{x}\ \text{arcsen}\sqrt{x} + 2\sqrt{1-x} + C$

2. $\ln\left|x + 2 + \sqrt{x^2 + 4x}\right| + C$

3. $\dfrac{\tan x}{4\sqrt{4 - \tan^2 x}} + C$

4. $x - \sqrt{1 - x^2}\ \text{arcsen}\,x + C$

5. $\dfrac{1}{4}\ln\left|\dfrac{x-3}{x+1}\right| + C$

6. $(\tan x)(\ln(\tan x)) - \tan x + C$

7. $\dfrac{1}{3}\left((x+1)^{\frac{3}{2}} - (x-1)^{\frac{3}{2}}\right) + C$

8. $-\dfrac{1}{6}\left(6e^{-x} + 3e^{-2x} + 2e^{-3x}\right) + C$

9. $2\sqrt{1+x} - 2\ln\left(1 + \sqrt{1+x}\right) + C$

10. $x - \ln\left(e^x + 1\right) + C$

11. $2\sqrt{x} - 3\sqrt[3]{x} + 6\sqrt[6]{x} - 6\ln\left(1 + \sqrt[6]{x}\right) + C$

12. $2\sqrt{x}\ e^{\sqrt{x}} - 2\,e^{\sqrt{x}} + C$

13. $-\dfrac{\arctan x}{4\left(x^2+1\right)^2} + \dfrac{3\arctan x}{32} +$
$\dfrac{x}{8\left(x^2+1\right)} + \dfrac{x\left(1-x^2\right)}{32\left(x^2+1\right)^2} + C$

14. $\dfrac{1}{4}\left(1+x^2\right)\ln\left(1+x^2\right) - \dfrac{1}{4}x^2 + C$

15. $x\,\text{arcsen}\left(\sqrt{x}\right) + \dfrac{1}{2}\sqrt{x}\ \sqrt{1-x} -$
$\dfrac{1}{2}\text{arcsen}\sqrt{x} + C$

16. $\dfrac{2^{e^x}\ 3^{e^x}}{\ln 2 + \ln 3} + C$

17. $x\tan x - x\sec x + \ln|1 + \text{sen}\,x| + C$

18. $2\sqrt{1+e^x} + \ln\left|\sqrt{1+e^x} - 1\right| -$
$\ln\left|\sqrt{1+e^x} + 1\right| + C$

19. $\dfrac{7}{3}\arctan\dfrac{x-3}{3} + C$

20. $\dfrac{3}{2}\ln\left|x^2 + 8x + 25\right| - \dfrac{10}{3}\arctan\dfrac{x+4}{3} + C$

21. $\dfrac{1}{6}\tan^6 x + \dfrac{1}{4}\tan^4 x + C$
ou $\quad\dfrac{1}{6}\sec^6 x - \dfrac{1}{4}\sec^4 x + C$

22. $\dfrac{2}{5}(1+x)^{\frac{5}{2}} - \dfrac{2}{3}(1+x)^{\frac{3}{2}} + C$

23. $\dfrac{1}{\sqrt{1-x^2}} + \dfrac{1}{2}\ln\left|\sqrt{1-x^2} - 1\right| -$
$\dfrac{1}{2}\ln\left|\sqrt{1-x^2} + 1\right| + C$

24. $\dfrac{1}{2}\text{sen}\,x - \dfrac{1}{10}\text{sen}\,(5x) + C$

25. $\arctan\dfrac{\sqrt{7}}{7} = \text{arcsen}\dfrac{\sqrt{2}}{4}$

26. $\dfrac{4}{25}\left(1 + \sqrt[4]{e^{3\pi}}\right)$

27. $\dfrac{10}{3}\sqrt{19} - 2\sqrt{3}$

28. $\dfrac{\pi}{3} - \dfrac{\sqrt{3}}{2}$

29. $\ln 7 - 2\ln 3$

30. $\dfrac{2}{15}$